WEB TOOLS TO VIEW AND POPULATE THE MONTANA CONTROL POINT DATABASE

FUNCTIONAL DESIGN

FINAL

Document History

Revision	Revised By	Comments
2.16.2009	John Waterman	Initial creation
3.20.2009	John Waterman	Draft I
3.24.2009	John Waterman	Draft 1.1: finished MCPD Viewer use cases
3.25.2009	John Waterman	Added req for basemap, legend TOC, updated info window attribute grid, added units comment to measure tool
3.26.2009	John Waterman	Updated content from 3.25.2009 meeting; added Use Cases for MCPD Administrator and MCPD Uploaded web sites; detailed technical design section
3.27.2009	John Waterman	Updated content from 3.27.2009 meeting
4.2.2009	**John Waterman**	**Finalized Document**

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1 Introduction

The purpose of this document:

- To present the products of the project discovery phase (requirements and analysis effort)
- To explain the nature of the system from the end-user's point of view (via Use Cases). The document should be written in English so that it can be reviewed and approved by the appropriate business participants.
- To detail of how the system must support alternate and exception flows through the use cases to ensure that the functional design is correct and complete
- To represent the systems through screen-shots, system diagrams or design level diagrams
- To deepen the technical team's understanding of the functional requirements of the system
- This document is a feed into, not a replacement for, the detailed technical design document

Before proceeding, please make sure you read and are familiar with the Functional Design Guidelines found in the appendix to this document.

Following this introduction are the following sections:

- Design Overview
- Business Solution
- Technical Solution
- Shared / Integrated Solutions
- Glossary
- Out-Of-Scope
- Approvals
- Functional Design Guidelines

2 Design Overview

The Web Tools to View and Populate the Montana Control Point Database will contain three separate web applications: **MCPD Viewer, MCPD Uploader, and MCPD Administrator**.

The **MCPD Viewer** web application will allow users to view control point data for MCPD, NGS, and BLM GCDB and their associated attribute information. Users will also be allowed to download subsets. Map service provided by ITSD and Google Maps will provide the geographic context and base map data.

The **MCPD Web Site and Spreedsheet Uploader** web application will allow data contributors (or licensed Montana Surveyors) to upload control points for inclusion into the MCPD. Data contributes may upload individual points via a form or via an Excel spreadsheet template.

The **MCPD Administrator** web application will allow an administrator to populate the MCPD feature class with newly approved data. Data is uploaded via the MCPD Uploader web application.

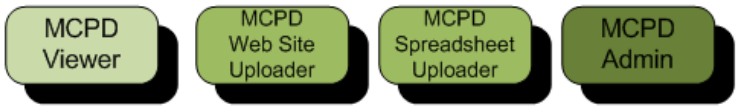


Figure 1: Conceptual System Design Diagram

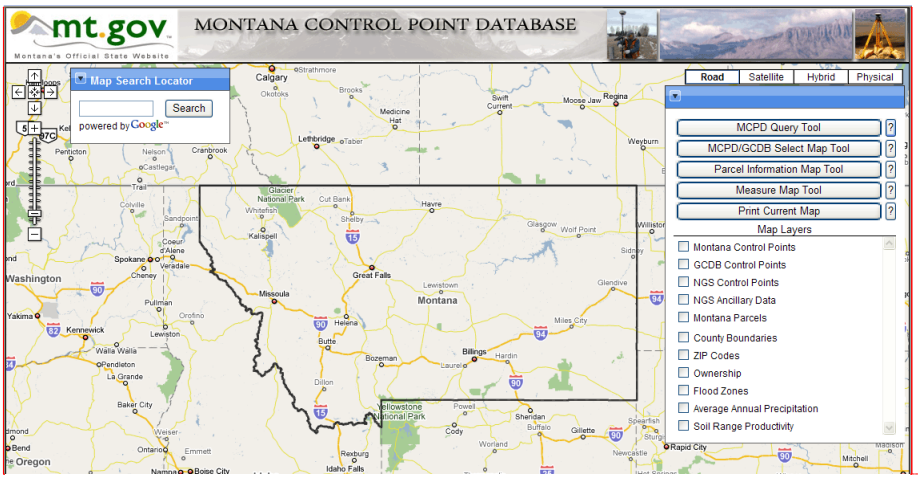


Figure 2: MCPD Viewer Mock-Up

Comment [jrw1]: Add "Site Credits" button/link to main viewer page

Comment [jrw2]: Add tabs for TOC and Legend; map legend will be static image

3 Business Solution

3.1 Introduction

This section contains (or references in another document) use cases, associated requirements and functional design for the system.

3.2 Roles

The table below contains roles that participate in the use cases defined for the system.

Role	Description	Location	Frequency (H, M, L)
data contributors (or licensed Montana Surveyors)	Licensed Montana Surveyors who would use the Viewer and Uploader applications	Montana	High
Public	Public users who would investigate control points via the Viewer application	Montana	Medium
MCPD Administrator	Administrator who would approve newly uploaded points from data contributors. Administrators would interact with data contributors as necessary to facilitate data upload and validation process.	Helena - ITSD	Low

Figure 3: Roles Table

3.3 Functional Requirements

All requirements can be stored here and reference the Use Cases below or they can be put in the Associated Requirements table under each Use Case.

MCPD Viewer Functional Requirements (RV)

ID	Requirement	Comments	Priority	XRef
RV1	Display MCPD point data	Display MCPD point data in Google Maps via an ITSD hosted ArcGIS Server cached map service		UCV2
RV2	Return MCPD attribute information from a map identify operation	Display a short-list of MCPD key attributes via map identify operation. Detailed project metadata and record level metadata will be delivered via a link in a Google Maps Info window. The link will open a user friendly layout containing more detailed MCPD Project metadata and record level metadata.		UCV1
RV3	Display NGS control points	Display National Geodetic Survey (NGS) control points in Google Maps via an ITSD hosted ArcGIS Server cached map service		UCV2
RV4	Return NGS attribute information from a map identify operation	Display a short-list of NGS key attributes via map identify operation. A URL link to the NGS data sheet will be displayed in the information window. NGS data sheets are hosted externally via USGS.		UCV2
RV5	Return GCDB attribute information from a map identify operation	Display a short-list of GCDB key attributes via map identify operation. NOTE: GCDB data sheet will not be displayed.		UCV2
RV6	Display GCDB points in map	Display GCDB (or PLSS) in map		UCV2
~~RV7~~	~~Display Cadastral Framework Map Service~~	~~Hosting by ITSD, mash cadastral map service into Google Maps~~		~~NA~~
RV8	Provide user friendly help	Provide popup context help that the user may toggle on/off - all functions.		UCV3
RV9	Measure Tool	Allow users to measure distance on the map. Display line segment and total length values as user clicks		UCV4
RV10	Print map tool	Allow users to print map. Create a new browser window map layout of the current map. Users use the browser to print.		UCV5
RV11	MCPD Query Tool	Allow users to select points by county, city, township, map buffer, or polygon. Also, select by survey date, surveyor, agency/firm, horizontal/vertical accuracy, data creation method, or control type (horizontal or vertical). Users can download result dataset via ASCII, KML, or PDF.		UCV6
RV12	MCPD/GCDB Select/Buffer Map Tool - Download control point tool	Users can download subsets of the MCPD and GCDB points via drawing a polygon on the map or buffering a point. Download format will be ASCII and KML. NGS data will not be available for download.		UCV7
RV13	Splash Screen	Intro page to frame-up web site which includes intro, disclaimer, and credits		UCV8
RV14	Parcel Information Tool	Allow user to display CAMA data for parcels		UCV9
RV15	Google Search Locator	Locate places on map using Google maps search engine		UCV10
RV16	Clear Map Tool	Clears any graphics on map from other map tools		NA

Comment [jrw3]: NOTE: No mock-up. Map cartography and labeling will be determined by Bob with provided Map Services.

Comment [jrw4]: NOTE: No mock-up. Map cartography and labeling will be determined by Bob with provided Map Services.

Comment [jrw5]: NOTE: No mock-up. Map cartography and labeling will be determined by Bob with provided Map Services.

Comment [jrw6]: Deleted RV7; added RV17 for basemap and RV18 for Layer TOC

Comment [jrw7]: Like Select Tool, Query tool will not allow users to select points from the NGS dataset?

Comment [jrw8]: Need data for geodata service from Bob; this is a technical design discussion

ID	Requirement	Comments	Priority	XRef
RV17	Montana Basemap	Montana basemap will be an additional Google Maps tab. It will contain a basemap service from ITSD. In addition, a Legend image will need to be displayed while users view the MT basemap.		NA
RV18	Layer Table of Contents	There will be a TOC for toggling individual layer visibility on/off		NA

Figure 4: MCPD Viewer (RV) Functional Requirements Table

Comment [jrw9]: Stu will define what these layers will be, i.e. each point dataset, Montana Cadastral, etc.

MCPD Uploader Functional Requirements (RU)

ID	Requirement	Comments	Priority	XRef
RU1	Create User Accounts	Provide means to create content provider accounts. Surveyor number is web site account user name.		UCU1
RU2	Upload MCPD points via spreadsheet	Provide means to upload a spreadsheet of MCPD control points. User uploads points via custom button on master spreadsheet		UCU2
RU3	Upload MCPD single point via web form	Provide means to upload a point via a web form interface		UCU2

Figure 4: MCPD Uploader (RU) Functional Requirements Table

Comment [jrw10]: Need to add password to database table; can we implement table level security?

MCPD Administrator Functional Requirements (RA)

ID	Requirement	Comments	Priority	XRef
RA1	Validate uploaded MCPD proposed data	Admin will confirm data uploaded from data provider for inclusion into the MCPD feature class		UCA1
RA2	Display and update surveyor account information ,i.e. contact info and passwords	Admin can update surveyor account information		UCA2
RA3	Edit dataset information before committing to production MCPD database	Admin can edit point locations and attributes to help facilitate promotion of datasets to production MCPD database		UCA1

Figure 5: MCPD Administrator (RA) Functional Requirements Table

Comment [jrw11]: Technical Design:
Bob: It was proposed @ the 2/25/2009 meeting that immediately following loading into or deleting from the CONTROL_POINT table that the application would drop then regenerate the ControlPoint_Point feature class. While this process will work it is not the most elegant solution.
1.1.1.1.A better solution would be to force referential integrity via a composite geodatabase relationship class IE when a table record is deleted the corresponding record in the related table/feature class is also deleted.
▪Advantages
•When deleting records synchronization will be enforced through database rules rather than through code
•The application will need to push only new records to the feature class rather than pushing all records to the feature class. This will produce faster updates as the size of both the CONTROL_POINT table and ControlPoint_Point feature class grow
▪Implications
•All tables will need to be registered with the geodatabase which means ArcObjects rather than pure SQL will need to be used when dealing with loading to and deleting from the database.

Comment [jrw12]: A project is a set of points; only one project in database; cannot append points to a project.

Comment [jrw13]: Approval is all or nothing, i.e. dataset

3.4 MCPD Viewer Use Cases (UCV)

The table below contains the most important use cases implied by the requirements for the system.

ID	Use Case	XRef	Priority	Comments
UCV1	Return control point attribute information from a map identify operation	RV2, RV4, RV5		Click on control point; info window displays key attributes for data source and link to data sheet; GCDB does not have data sheet
UCV2	User sees map with MCPD, NGS, and GCDB datasets	RV1, RV3, RV6		TODO: Need map service in order to create mock-up; maybe not necessary at this point; this can be demonstrated to the team for feedback once the services are available.
UCV3	Show user friendly help for every tool	RV8		User clicks on help button beside tool and reads detailed help regarding tool
UCV4	User measures line segment on map	RV9		User draws line on may which displays segment and total distance
UCV5	User prints current map	RV10		User prints current map from new layout window
UCV6	User downloads point subset using MCPD Query Tool	RV11		Using a form-based query, user downloads a subset of the MCPD or GCDB
UCV7	User downloads point subset using a map selection tool – by either polygon or buffered point selection area	RV12		Using an interactive map selection tool, user selects a set of points on the map by digitizing a polygon or clicking a point and entering a radius to create a circle selection area. User downloads subset to a file.
UCV8	User sees splash screen when entering web site	RV13		User sees an informative splash screen which frames up the site on entry. Splash screen includes language for disclaimer and site credits.
UCV9	User selects parcel and views associated CAMA data	RV14		Uses the Montana Cadastral web service
UCV10	User finds a location using Google Search bar	RV15		User types in a place name, i.e. city, place, or address. Map zooms or pans to location.

Figure 6: Use Case Table

Use Case Scenarios

3.4.1 Introduction

This section contains the important scenarios relating to the system's key use cases.

3.4.2 MCPD Viewer Use Cases

3.4.2.1 Return control point attribute information from a map identify operation

Use Case	**UCV1**
Use Case Name	Return control point attribute information from a map identify operation
Role(s):	Site user
Summary:	Click on control point; info window displays key attributes for data source and link to data sheet; GCDB does not have data sheet
Related Business Rules:	GCDB does not have data sheet
Scenario:	**UCV1.1**
Preconditions:	Viewing map with control points
Postconditions:	Viewer sees Google map info window with key attributes and datasheet link
Basic Course of Events:	1. Click on control point 2. Info window displays key attributes for data source and link to data sheet 3. View datasheet in new browser window by clicking on dataset link in info window

ID	**U001 - Associated Requirements**
RV2	Return MCPD attribute information from a map identify operation
RV4	Return NGS attribute information from a map identify operation
RV5	Return GCDB attribute information from a map identify operation

Comment [jrw14]: PDF for MCPD datasheets

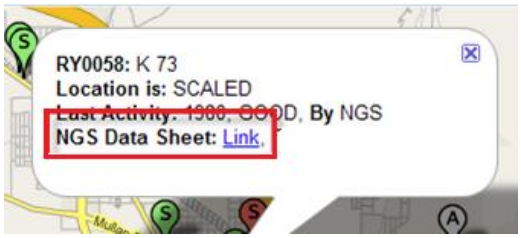


Figure 7: Mock-up Info Window with attributes for NGS point

The NGS Data Sheet

```
See file  dsdata.txt for more information about the datasheet.
DATABASE =  ,PROGRAM = datasheet, VERSION = 7.64
1        National Geodetic Survey,   Retrieval Date = DECEMBER 11, 2008
 TM0650 ************************************************************************
 TM0650  DESIGNATION -  A 423
 TM0650  PID         -  TM0650
 TM0650  STATE/COUNTY-  MT/GLACIER
 TM0650  USGS QUAD   -  CUT BANK (1980)
 TM0650
 TM0650                        *CURRENT SURVEY CONTROL
 TM0650  ______________________________________________________________________
 TM0650* NAD 83(1999)-  48 37 39.90448(N)    112 22 12.96449(W)     ADJUSTED
 TM0650* NAVD 88     -      1144.468  (meters)    3754.81   (feet)  ADJUSTED
 TM0650  ______________________________________________________________________
 TM0650  X           -  -1,607,742.140 (meters)                     COMP
 TM0650  Y           -  -3,906,427.302 (meters)                     COMP
 TM0650  Z           -   4,764,146.713 (meters)                     COMP
 TM0650  LAPLACE CORR-         -0.80  (seconds)                    DEFLEC99
 TM0650  ELLIP HEIGHT-       1129.628 (meters)          (03/28/07) ADJUSTED
 TM0650  GEOID HEIGHT-        -14.78  (meters)                     GEOID03
 TM0650  DYNAMIC HT  -       1144.504 (meters)    3754.93  (feet)  COMP
 TM0650  MODELED GRAV-     980,601.9   (mgal)                      NAVD 88
 TM0650
 TM0650  HORZ ORDER  -  B
 TM0650  VERT ORDER  -  FIRST     CLASS II
 TM0650  ELLP ORDER  -  FOURTH    CLASS II
 TM0650
 TM0650.The horizontal coordinates were established by GPS observations
 TM0650.and adjusted by the ROBERT PECCIA AND ASSOCIATES in March 2007.
```

Figure 8: NGS Datasheet

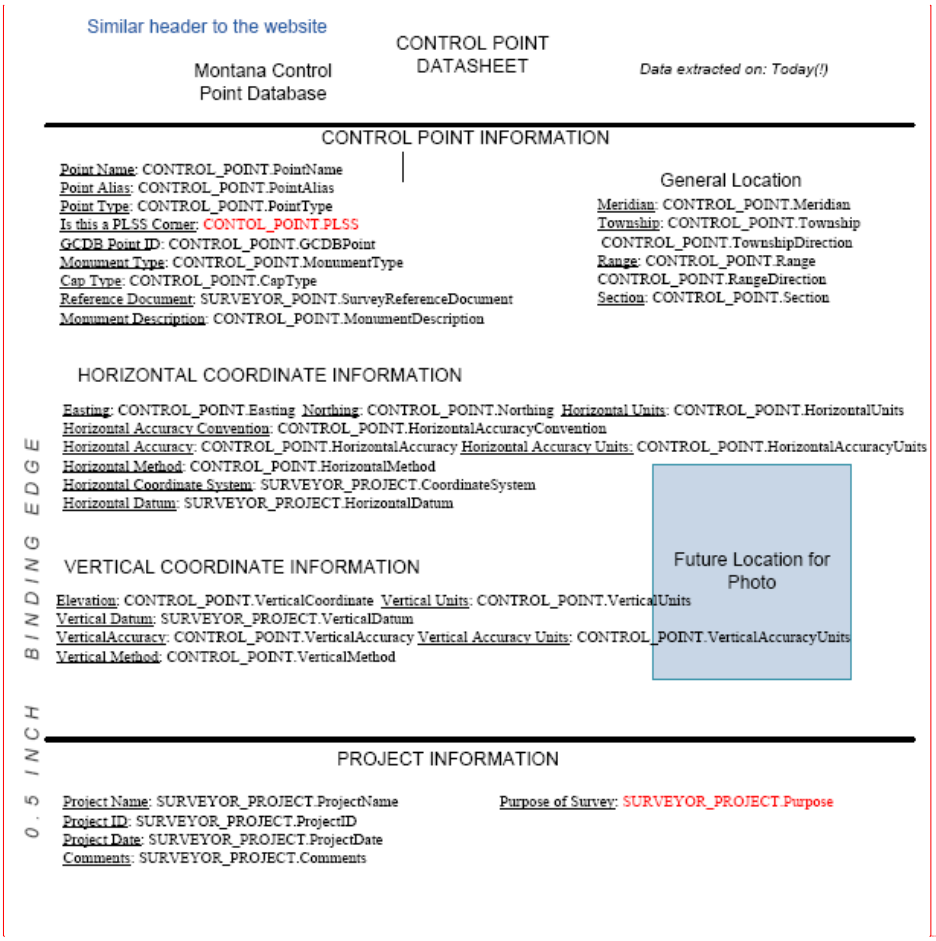


Figure 9: MCPD Datasheet

MCPD Field Names		**NGS Field Names**		**GCDB Field Names**	
Field Name	**Alias**	**Field Name**	**Alias**	**Field Name**	**Alias**
PointName	Point Name	NAME	Point Name	PointLab	GCDB ID
PointAlias	Alias	PID	NGS ID	ERRORN	X Error
PointType	Point Type	H_ORDER	Horizontal Order	ERRORE	Y Error
PLSS	PLSS Point?	V_ORDER	Vertical Order		
NA	Data Sheet	DATA_SRCE	Data Sheet		

Figure 10: Key attributes that will appear in Google Map Info window

Comment [jrw15]: This will be delivered as a PDF

Comment [jrw16]: Table is current version from Zim

3.4.2.2 Show user friendly help for every tool

Use Case	**UCV3**
Use Case Name	Show user friendly help for every tool
Role(s):	Site user
Summary:	User can view detailed help for tools
Related Business Rules:	
Scenario:	**UCV3.1**
Preconditions:	User would like to understand how to use a tool
Postconditions:	User understands how to use tool
Basic Course of Events:	1. User clicks on help button beside a tool 2. User reads detailed tool directions in window

ID	**U001 - Associated Requirements**
RV8	Provide user friendly help

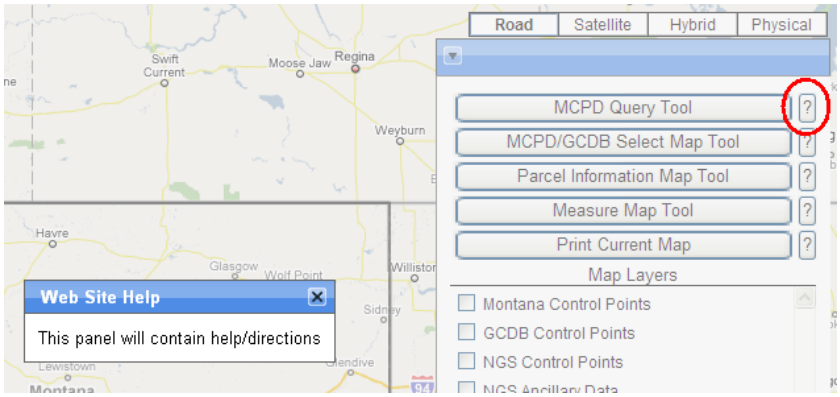


Figure 11: Tool Help: User clicks on help button beside tool. A window displays detailed help for the tool.

3.4.2.3 User measures line segment on map

Use Case	**UCV4**
Use Case Name	User measures line segment on map
Role(s):	Site Users
Summary:	User measures distance on map
Related Business Rules:	
Scenario:	**UCV4.1**
Preconditions:	User wants to measure a distance on map
Postconditions:	User has line measurements
Basic Course of Events:	1. Click the "measure" tool to activate the tool 2. Initiate line with a mouse click 3. Drag mouse cursor and click a second time to establish a line 4. Distance is displayed on map 5. User clicks again to create two line segments. 6. Each line segment and total is displayed on map.

ID	**U001 - Associated Requirements**
RV9	Measure Tool

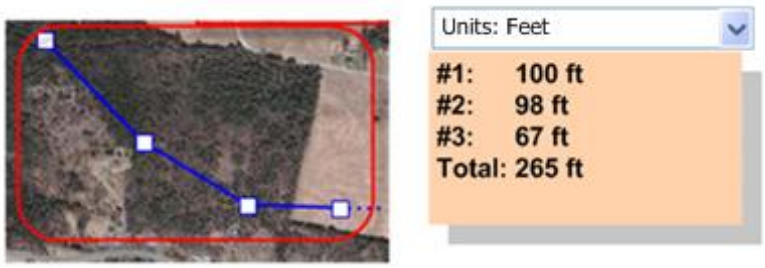


Figure 12: Measure Tool: User clicks on map to create line segments with associated distance and total distance.

Comment [jrw17]: User will be able to change units dynamically, i.e. ft, meters, miles, km, chains.

3.4.2.4 User prints current map

Use Case	**UCV5**
Use Case Name	User prints current map
Role(s):	All site users
Summary:	User would like a hardcopy of the current map
Related Business Rules:	
Scenario:	**UCV5.1**
Preconditions:	User has map in a desirable extent for printing
Postconditions:	User has hardcopy map
Basic Course of Events:	1. User clicks "Print" tool 2. New browser window opens up with map page layout containing current map extent and mash data along with legend, north arrow, and scale. 3. User uses browser print tools to resize, preview, etc. and ultimately print map.

ID	**U001 - Associated Requirements**
RV10	Print Map Tool

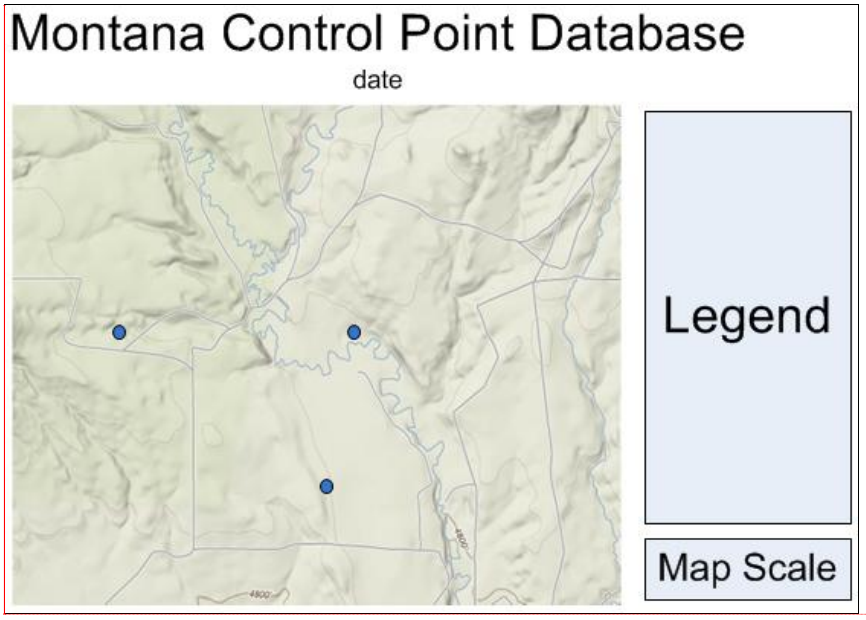


Figure 13: Print tool: user pushes the print button; a new browser window opens up with current map and mash data. User will print from browser. Technically, this will be a Google Maps control that will be read-only.

Comment [jrw18]:
•Scale will be, i.e.: 1:2400; not scalebar
•Do not include north arrow in layout

3.4.2.5 User downloads point subset using MCPD Query Tool

Use Case	**UCV6**
Use Case Name	User downloads point datset subset using MCPD Query Tool
Role(s):	All site users
Summary:	Using a form-based query, user downloads a point subset of the MCPD or GCDB
Related Business Rules:	
Scenario:	**UCV6.1**
Preconditions:	NA
Postconditions:	User created selection set containing MCPD and/or GCDB points
Basic Course of Events:	1. User clicks "Query" tool button 2. Query form appears 3. User selects search criteria 4. User selects file output format, i.e. text, KML, or PDF. 5. User clicks download button 6. A file with data is presented to the user for download to local disk

ID	**U001 – Associated Requirements**
RV12	MCPD/GCDB Select Map Tool – Download control point tool

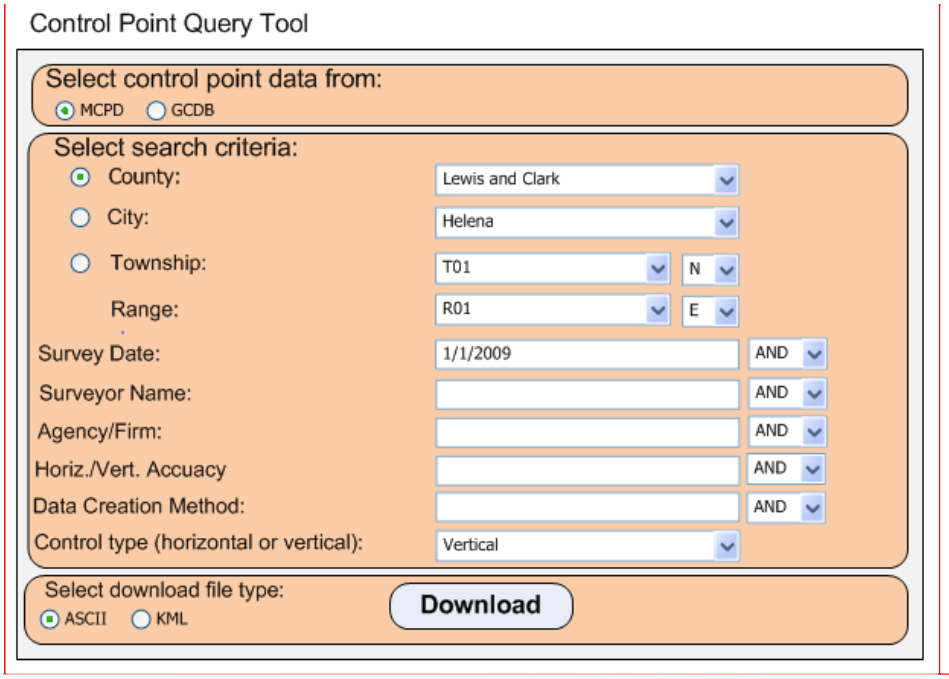


Figure 14: Query Tool: User chooses dataset types, search criteria (both spatial and tabular), and download file type.

Comment [jrw19]: Is text/PDF in the dataset format or spreadsheet grid? Data sheet format file may be very large for a great number of points?

Comment [jrw20]:
•Download MCPD/GCDB in two different files.
•Spatial queries only relate to MCPD; if user chooses GCDB, county, city, and township/range search criteria options will be greyed out
•Use domain for Control Type
•AND and OR SQL

Comment [jrw21]: Confirmation dialog after user clicks download; display number of records returned in query for confirmation before actually downloading data.

Comment [jrw22]: Add radio buttons to make spatial filters mutually exclusive

3.4.2.6 User downloads point subset using a map selection tool – by either polygon or buffered point selection area

Use Case	**UCV7**
Use Case Name	User downloads point subset using a map selection tool
Role(s):	Any site user
Summary:	Using an interactive map selection tool, user selects a set of points on the map by digitizing a polygon or clicking a point and entering a radius to create a circle selection area. User downloads subset to a file.
Related Business Rules:	
Scenario:	**UCV7.1: Download point subset with polygon map selection area**
Preconditions:	Viewing points of interest in map viewer
Postconditions:	Downloaded subset of points in a file
Basic Course of Events:	1. User activates Selection map tool 2. Chooses to digitize polygon as opposed to buffer a point for selection area 3. Digitizes a polygon around a set of points in either the MCPD and/or GCDB datasets 4. Is prompted to choose a download file format: ASCII, KML, or PDF a. If points do not occur in polygon, a message will be displayed indicating this. 5. Saves file to local disk
Scenario:	**UCV7.2: Download point subset by buffed point map selection area**
Preconditions:	Viewing points of interest in map viewer
Postconditions:	Downloaded subset of points in a file
Basic Course of Events:	1. User activates the Selection map tool 2. Chooses to buffer a point and enters a radius distance for selection area 3. Places a point to be buffered by clicking on map 4. Point and circle buffer is drawn on map 5. User is prompted to choose a download file format: ASCII, KML, PDF a. If points do not occur in polygon, a message will be displayed indicating this. 6. Saves file to local disk

ID	**U001 - Associated Requirements**
RV12	MCPD/GCDB Select/Buffer Map Tool - Download control point tool

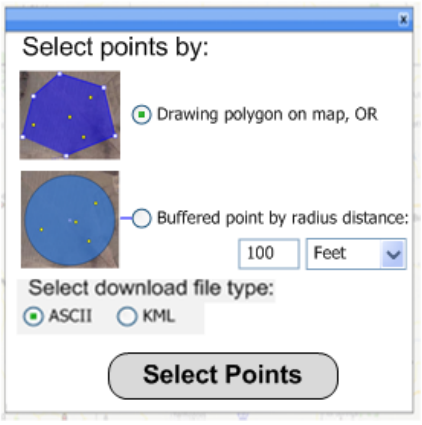
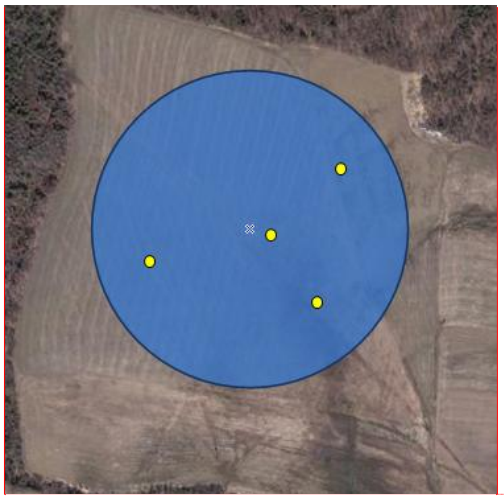


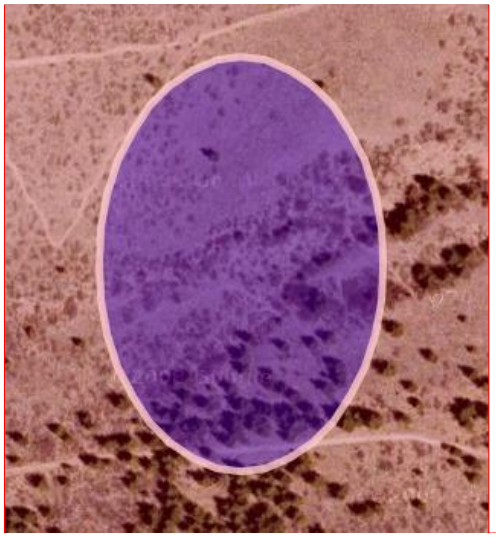
Figure 15: After clicking the select tool button, user is prompted to choose a selection and output file type.

Comment [jrw23]:
•Limit to 6 miles/km (and feet/meters to 6 miles/km)

Figure 16: After choosing selection type for polygon, user digitizes polygon around points of interest; double clicking to finish polygon selection area.



Comment [jrw24]:
•Change map extent to envelope of buffered point when use clicks



Comment [jrw25]: Note: buffered geometry will remember an ellipse due to projection issues

Figure17: After choosing the buffered point selection type, user clicks on map to establish center of circle.

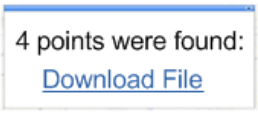


Figure 18: If points were selected, user is prompted to download file.

3.4.2.7 User sees splash screen when entering web site

Use Case	**UCV8**
Use Case Name	User sees splash screen when entering web site
Role(s):	All site users
Summary:	User sees an informative splash screen which frames up the site on entry. Splash screen includes language for disclaimer and site credits.
Related Business Rules:	
Scenario:	**UCV8.1**
Preconditions:	NA
Postconditions:	User has entered map viewer
Basic Course of Events:	1. User goes to map viewer URL in browser 2. User sees splash screen 3. User clicks Disclaimer button to view disclaimer 4. User clicks Site Credits button to view site credit information 5. User clicks Enter to view map

ID	**U001 - Associated Requirements**
RV13	Splash Screen

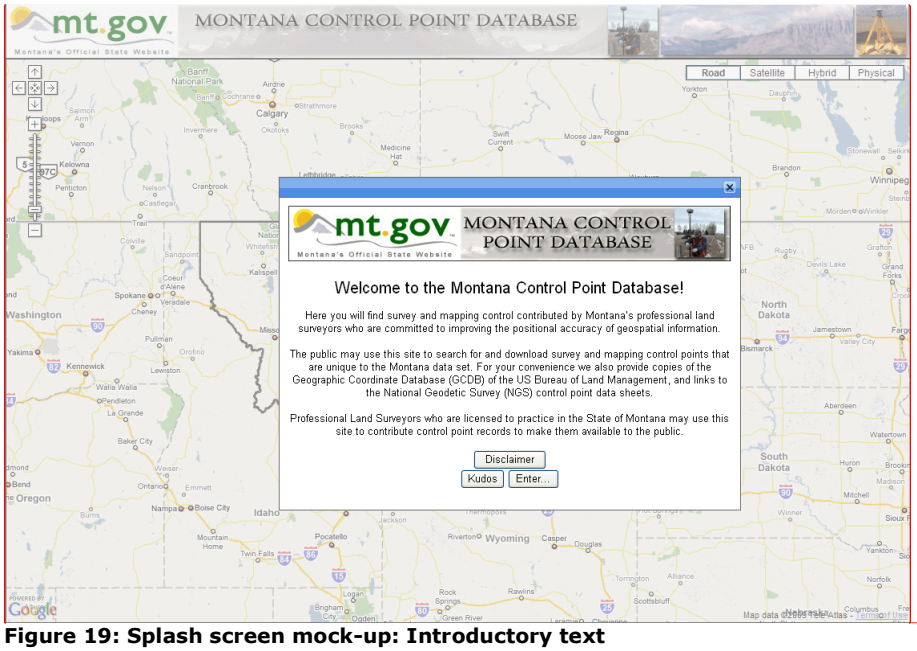


Figure 19: Splash screen mock-up: Introductory text

Comment [jrw26]: Add radio/check box buttons to confirm user agrees with Disclaimer

Comment [jrw27]: "Kudos" button should be "Site Credits"

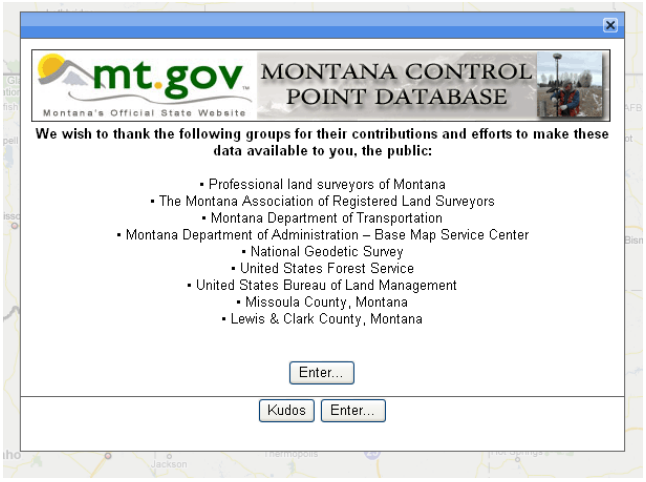


Figure 20: Splash screen mock-up: example of site credits

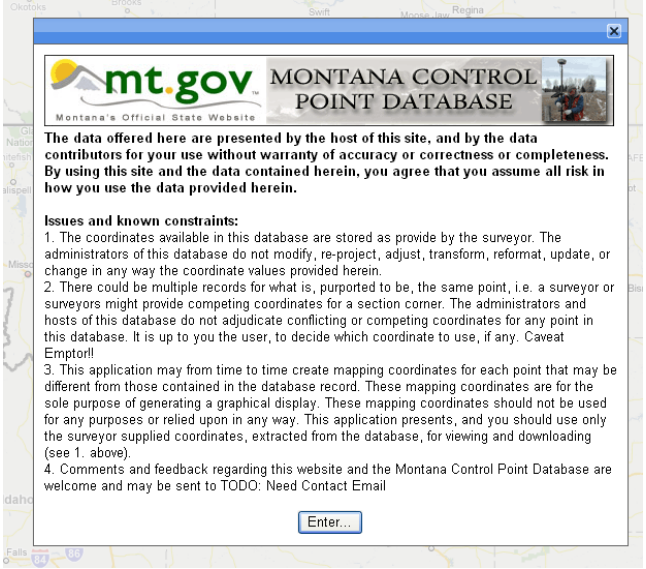


Figure 21: Splash screen mock-up: Disclaimer text

3.4.2.8 User selects parcel and views associated CAMA data

Use Case	**UCV9**
Use Case Name	User selects parcel and views associated CAMA data
Role(s):	All site users
Summary:	User selects a parcel and views associated CAMA data from the State of Montana's cadastral web service
Related Business Rules:	
Scenario:	**UCV9.1**
Preconditions:	Viewing a parcel of interest in map
Postconditions:	Views parcel's associated CAMA data
Basic Course of Events:	1. User clicks parcel information tool 2. Parcel layer's visibility is turned on 3. User clicks parcel in map 4. User views parcel's associated CAMA data

ID	**U001 - Associated Requirements**
RV14	Parcel Information Tool

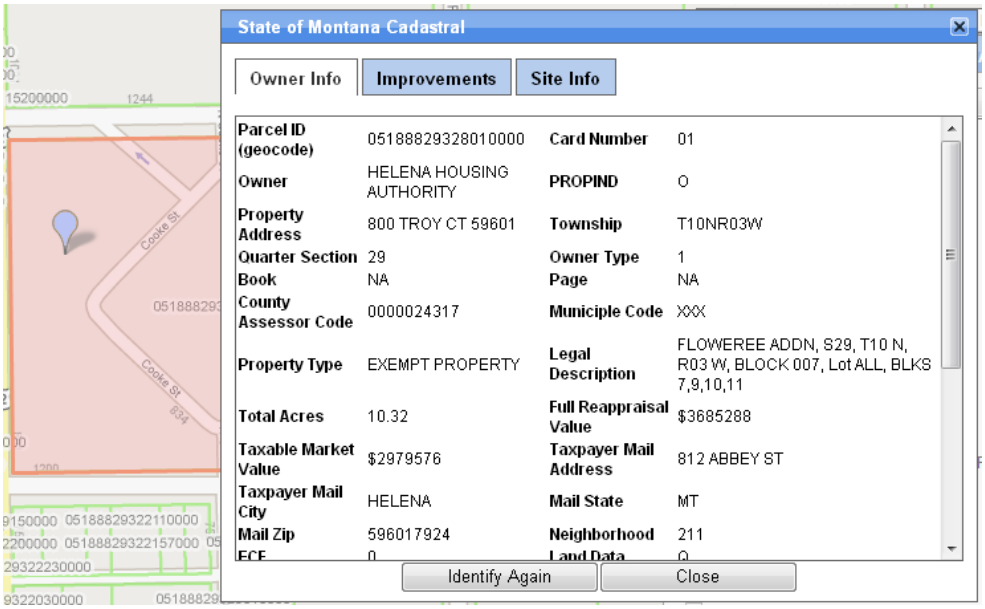


Figure 22: Clock on parcel to retrieve associated CAMA information.

3.4.2.9 User finds a location using Google Search bar

Use Case	**UCV10**
Use Case Name	User finds a location using Google Search bar
Role(s):	
Summary:	Locate places on map using Google maps search engine
Related Business Rules:	
Scenario:	**UCV10.1**
Preconditions:	Would like to find a city of the map, i.e. Helena
Postconditions:	Map is centered on city
Basic Course of Events:	1. User types in "Helena" in Google search bar 2. User clicks "Search" button 3. Map zooms to first location found by Google search bar

ID	**U001 - Associated Requirements**
RV15	Google Search Locator

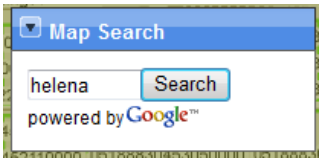


Figure 23: User enters "Helena" and clicks "Search"; map pans and centers on City of Helena.

Comment [jrw28]: Will include Google search in design. If during testing there appears to be issues, may remove search bar; as oppose, to spending time fixing issues.

3.5 MCPD Uploader Use Cases (UCU)

The table below contains the most important use cases implied by the requirements for the system.

ID	Use Case	XRef	Priority	Comments
UCU1	New user creates surveyor account	RU1		New user creates an account. Surveyor number is web site account user name.
UCU2	Surveyor uploads MCPD control points	RU2, RU3		Surveyor uploads new MCPD control points via spreadsheet or Uploader web site.

Figure xxx: Use Case Table

Use Case Scenarios

3.5.1 Introduction

This section contains the important scenarios relating to the system's key use cases.

3.5.2 MCPD Uploader Use Cases

3.5.2.1 New user creates surveyor account

Use Case	**UCU1**
Use Case Name	New user creates surveyor account
Role(s):	Surveyors
Summary:	New user creates an account. Surveyor number is web site account user name.
Related Business Rules:	Montana Interactive validates surveyor license number via web service
Scenario:	**UCU1.1**
Preconditions:	Surveyor wants to upload data, but does not have account
Postconditions:	Surveyor can log into MCPD Uploader web site or spreadsheet
Basic Course of Events:	1. Surveyor goes to MCPD Uploader web site or opens MXPD spreadsheet 2. Clicks "Create New Account" button 3. Enters Surveyor number 4. Enters password (twice) 5. Get notification if account was created successfully or not. 6. Logs into MCPD Uploader web site.

ID	**U001 - Associated Requirements**
RU1	Create User Accounts

Table
SURVEYOR

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	Object ID						
FirstName	String	No					50
LastName	String	No					50
LicenseNumber	String	No					25
Phone	String	No					15
BusinessName	String	Yes					255
Address1	String	No					100
Address2	String	Yes					100
City	String	No					50
State	String	No					2
ZipCode	String	No					10
Email	String	No					255

Figure xxx: Surveyor database entity diagram. This shows the information that will be stored in the database for a surveyor. Surveyors and the Administrator will be able to update this information. NOTE: License Number will not be editable.

Comment [jrw29]: When creating new account, only information to confirm account is entered.

Comment [jrw30]: Technical: Work with Montana Interactive to figure out what information needs to be sent along with License Number for validation.

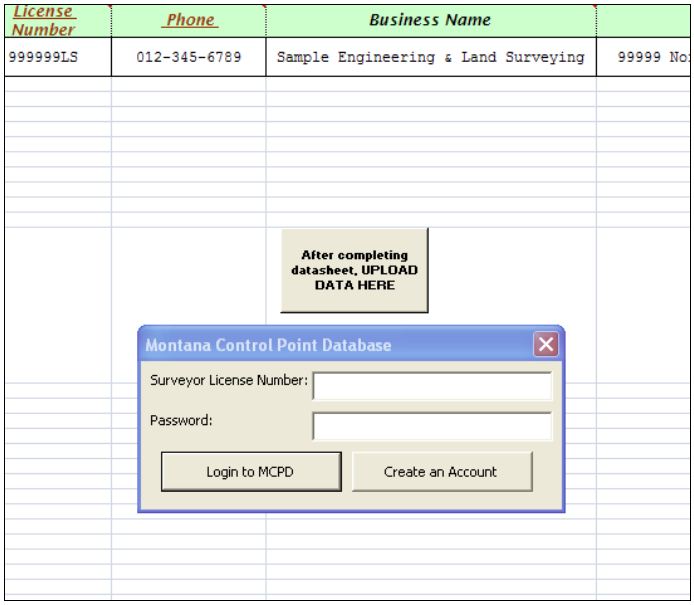


Figure xxx: Surveyor needs to login before uploading data via Excel spreadsheet and gaining access to MCPD Uploader web site.

3.5.2.2 Surveyor uploads MCPD control points

Use Case	**UCU2**
Use Case Name	Surveyor uploads MCPD control points
Role(s):	
Summary:	Surveyor uploads new MCPD control points via spreadsheet or Uploader web site.
Related Business Rules:	
Scenario:	**UCU2.1**
Preconditions:	Surveyor has signed into spreadsheet or Uploader web site.
Postconditions:	Surveyor uploaded new MCPD control points
Basic Course of Events:	1. Surveyor enters control point information into Uploader web site or spreadsheet. 2. Surveyor submits information 3. A message to surveyor says new point information has been uploaded and they will receive an email when new information has been confirmed and promoted to production database.

ID	**U001 - Associated Requirements**
RU2	Upload MCPD points via spreadsheet
RU3	Upload MCPD single point via web form

3.6 MCPD Administrator Use Cases (UCA)

The table below contains the most important use cases implied by the requirements for the system.

ID	Use Case	XRef	Priority	Comments
UCA1	Administrator validates uploaded MCPD proposed data	RA1		Admin will confirm data uploaded from data provider for inclusion into the MCPD feature class
UCA2	Administrator updates surveyor account information	RA2		Admin can update surveyor account information
UCA3	Administrator edits MCPD dataset attributes	RA3		Administrator updates surveyor's dataset attributes before it is promoted to MCPD production table. Administrator may communicate with surveyor via phone/email directly to fix potential dataset errors before promoting to MCPD production database.

Figure XXX: Use Case Table

3.6.1.1 Administrator validates uploaded MCPD proposed data

Use Case	**UCA1**
Use Case Name	Administrator validates uploaded MCPD proposed data
Role(s):	Site Administrator
Summary:	Admin will confirm data uploaded from data provider for inclusion into the MCPD feature class
Related Business Rules:	
Scenario:	**UCA1.1**
Preconditions:	Surveyor has uploaded new control point project
Postconditions:	Administrator validated surveyor project and promotes to MCPD production
Basic Course of Events:	1. Administrator chooses a "project" from list of current projects to be validated 2. Confirm surveyor and project information 3. Administrator iterates through each point and checks attributes a. If an error is found, Administrator can change attribute. b. Admin may need to contact surveyor via phone/email for clarifications. c. A map will display the current point. 4. Once Admin is satisfied with project, they can promote the project to production by clicking a button.

ID	U001 - Associated Requirements
RA1	Validate uploaded MCPD proposed data
RA3	Edit dataset information before committing to production MCPD database

Table
SURVEYOR_PROJECT

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	Object ID						
ProjectName	String	No					50
ProjectID	String	No					100
ProjectDate	Date	No			0	0	8
CoordinateSystem	String	No					100
HorizontalDatum	String	No					50
VerticalDatum	String	No					50
SurveyorPurpose	String	Yes					1000
Positions	String	Yes					1000
SurveyType	Double	Yes			0	0	
SurveyReferenceDocument	String	Yes					1000
Comments	String	Yes					1000
ProviderID	String	No					25
DatasetID	String	No	SPT				3
URID	String	No					25
PKey	String	No					55

Figure XXX: Surveyor Project database entity diagram. Administrator will validate this information, and if need be, make corrections.

Comment [jrw31]: Admin needs to be able to delete a project; points will automatically be deleted via a GDB composite relationship

Comment [jrw32]: Need project validated field

Table
CONTROL_POINT

Field name	Data type	Allow nulls	Default value	Domain	Prec-ision	Scale	Length
OBJECTID	Object ID						
DateEntered	Date	Yes			0	0	8
DateUpdated	Date	Yes			0	0	8
PointName	String	No					100
PointAlias	String	Yes					100
PointType	String	No					100
GCDBPointID	String	Yes					25
MonumentType	String	Yes					255
MonumentDescription	String	Yes					255
CapType	String	Yes					50
Meridian	String	Yes					100
Township	String	Yes					10
TownshipDirection	String	Yes					5
Range	String	Yes					10
RangeDirection	String	Yes					5
Section	String	Yes					5
CoordinateSystem	String	No					100
CoordinateSystemZone	String	Yes					100
Easting	Double	No			0	0	
Northing	Double	No			0	0	
HorizontalUnits	String	No					50
HorizontalDatum	String	No					50
HorizontalMethod	String	Yes					100
HorizontalAccuracy	Double	No			0	0	
HorizontalAccuracyUnits	String	Yes					50
HorizontalAccuracyConvention	String	Yes					50
VerticalCoordinate	Double	Yes			0	0	
VerticalUnits	String	Yes					50
VerticalDatum	String	No					50
VerticalMethod	String	Yes					100
VerticalAccuracy	Double	Yes			0	0	
VerticalAccuracyUnits	String	Yes					50
VerticalAccuracyConvention	String	Yes					50
PLSSCorner	Double	Yes			0	0	
ControlPointStatus	String	Yes					50
ProviderID	String	No					25
DatasetID	String	No	CPT				3
URID	String	No					25
PKey	String	No					55
SurveyorProjectID	String	No					55

Figure XXX: Control Point database entity diagram. Admin will be able to update information in this table before it is promoted to the ControlPoint_Point Feature Class.

3.6.1.2 Administrator updates surveyor account information

Use Case	**UCA2**
Use Case Name	Administrator updates surveyor account information
Role(s):	Site Administrator
Summary:	Admin can update surveyor account information
Related Business Rules:	
Scenario:	**UCA2.1**
Preconditions:	Admin needs to update surveyor account information
Postconditions:	Surveyor account contract information is updated
Basic Course of Events:	1. Admin chooses surveyor from surveyor list. 2. Admin updates surveyor account information and saves changes

ID	**U001 - Associated Requirements**
RA2	Display and update surveyor account information ,i.e. contact info and passwords

3.7 Reporting

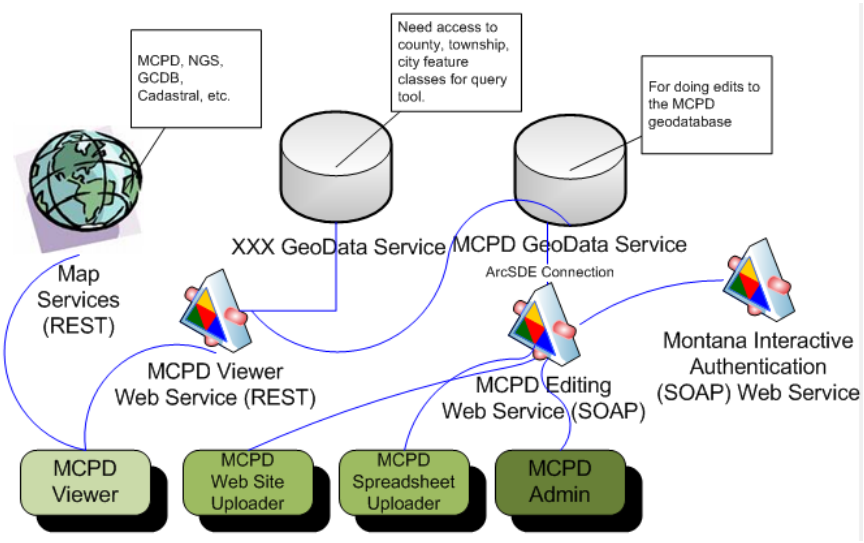
List all reporting needs for the project. Each report should be defined in terms of selection criteria, calculation requirements, data elements, format, etc. Additional data mapping and SQL syntax development will be done during the technical design.

- For the MCPD Viewer, reporting will include the MCPD Data Sheet.
- See above Use Case for MCPD Data Sheet mock-up and data mapping.

4 Technical Solution

4.1 Introduction

This section outlines major technical considerations that need to be considered in context of the overall solution.



4.2 Non-Functional Requirements Table

List the non-functional or system requirements.

ID	Non-Functional Requirements
NF1	ArcGIS Server GeoData Service to support Query Tool spatial queries, i.e. county, township/range, city spatial queries.
NF2	ArcGIS Server GeoData Service (or LAN Map Service) or performing edits to the MCPD geodatabase
NF3	ArcGIS Server Google Maps compatible REST Map Services for MCPD Viewer's layer table of contents, i.e. point feature classes, cadastral, county, etc.
NF4	MCPD Viewer REST Web Service – this service will process server-side requests from the Google Maps based MXPD Web Site Viewer, i.e. all AGS queries, geometry operations, etc.
NF5	MCPD Editing Web Service (SOAP) – this service will support all MCPD geodatabase editing/query functionality and new account authentication and creation – both Excel spreadsheet, web site uploader, and admin sites will consume this service.
NF6	Montana Interactive Web Service (SOAP) – authenticates new surveyor accounts

Comment [jrw33]: Stu is working to define the layers to be included in the Layers Table of Contents

Figure 5: Non-Functional Requirements

4.3 Data Considerations

4.3.1 Data Base(s)

List current data stores or proposed data store details including high level Entity Relationship Diagram.

- MCPD Geodatabase as described in:

- MCPD_20090123_ERD.jpg
- MCPD_20090123_LOOKUPS.jpg
- Also available in VISIO format

4.3.2 Data Capture and Data Conversion

List all current system data stores, the plan for conversion/migration and the plan for new data capture in the system.

- NA

4.4 Platform, Hardware & Software

List the platform considerations and the estimated hardware and software requirements. Include connectivity requirements.

- ArcGIS Server and related services will be hosted by ITSD; platform considerations are not relevant to the development of the MCPD applications; MCPD applications need to consume the outlined services.

4.5 Security

This section references the security requirements, detailing access, availability, roles and rights.

- Montana Interactive will confirm Surveyor license for new account creation.
- For MCPD editor and admin sites, ASP.NET Windows Service session state will be used.

Comment [jrw34]: Bob is working to confirm this.

4.6 Impacted Systems

This section lists the systems impacted by the solution.

- MCPD applications: NA

5 Glossary

List and define all project terms.

Term	Definition

Figure 6: Glossary

6 Out-Of-Scope

List all requirements, Use Cases, technologies or concepts that have fallen out-of-scope during this phase of the project.

ID	Comment

Figure 7: Out-of-Scope

<Please include a brief summary of the plan for the out of scope items (ex: "Items 1-8 will be addressed in 1.1 and 2.0 phases of this project that are roughly slated for Q4 2007. Items 9-10 will not be addressed as part of this application but have been deemed workflow and training issues.">

7 Approvals

Role	Person	Date
Business Owner		
Project Manager		
Business Process Committee		
Developer / Architect		

By approving, the above requirements are acceptable representations of business requirements and sufficient to complete technical design to the best of current knowledge. Additional items always arise. Going forward, they will be analyzed for their impact on scope. Approvals should be posted into SharePoint site.

8 Appendix: Functional Design Guidelines

- **Requirements Driven**: Functional Design is "requirements-driven": All documented use cases and their corresponding scenarios will be derived from requirements or be logically inferred by them.
- **Efficiency:** Functional Design will be efficient. No more analysis work will be carried out beyond that necessary to identify the most important scenarios and solution challenges.
- **Requirements Tracking:** Each requirement is assigned a unique identification number when it is recorded. The identification numbers for requirements are prefixed with the letter "R". Even if a requirement is subsequently deleted, its identification number cannot be used by any other requirement.
- **Requirements Management:** Some functional requirements may not tie directly to a use case and will be placed in the Functional Requirements table, though this may be an indication that the requirement may be out-of-scope and should be analyzed.
- **Use Case Syntax**: Use cases are best described in an Object>Verb>Direct Object format. For example, User Creates Order, User Modifies Order, User Deletes Order. This allows for easy grouping and analysis of Use Cases, though it is understood that not all requirements will fit this paradigm.
- **Use Case Tracking:** Each use case is assigned a unique identification number when it is recorded. The identification numbers for use cases are prefixed with the letter "U". Even if a use case is subsequently deleted, its identification number cannot be used by any other use case.
- **Use Case Scenarios:** Use Case Scenario sections contain their accompanying requirements and any further functional design required to come to a complete understanding of ambiguous, complicated or contradictory requirements or scenarios. Many types of diagrams, descriptions or other tools may assist in this process. Swimlane diagrams, interaction diagrams, state diagrams, representative screen mock-ups or other tools may be used to further define or clarify Use Cases.
- **User Interfaces:** Screen mock-ups are meant to capture functional need and do not necessarily represent the final look-and-feel of the user interface based on many functional and non-functional constraints not known at this phase of the solution.
- **Business Rules:** Each Use Case should include the necessary business rules as well as the process / system flow context. Often, it is most efficient to highlight the appropriate business rules at the end of UC.
- **Scalability:** Functional Requirements/Design approach depends on project and users. In some cases a very discreet requirements discovery vs. functional design approach will work best, in others an iterative and highly collaborative requirements and design is best suited that includes an Analyst, SME, and Developer/Technical lead. Regardless, the approach should be highly scalable. Smaller or less complex projects will require less documentation.
- **Scope:** Sometimes in the flow of the use case, critical manual processes occur. These should be noted as such. These processes may be envisioned for automation in a future release and a note should be added that this is outside the scope of this release to the Out-of-Scope section.
- **Project Document Management:** Associated documents may be required to fully describe the Functional Design. It is understood that separate requirements lists, Visio diagrams, workflow or other descriptive documents will be stored alongside this documents in order to provide further context. These documents can be referenced from this document or stored alongside it in the project repository.
- **Glossary agreement:** When ambiguous, highly technical or business centric items in Functional Design are identified, a corresponding glossary entry will be defined.